Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

THE ANALYST.

Vol. I. May, 1874. No. 5.

COSMICAL MECHANISM.

BY PROF. P. E. CHASE, HAVERFORD COLLEGE, PA.

The following evidences of the influence of spherical undulations in determining the various harmonies of the solar system, may perhaps interest the readers of the ANALYST:

Let $V\lambda$ = velocity of light.

$\frac{1}{2}V\lambda$ = *mean* velocity communicable by oscillations of $V\lambda$, the velocity varying between 0 and $V\lambda$.

$$\frac{V\lambda}{\pi} = \frac{2}{\pi} \times \frac{V\lambda}{2} =$$

mean velocity of a perpetual radial oscillation, synchronous with a circular oscillation of $\frac{1}{2}V\lambda$, and *nearly* equal the mean velocity of a synchronous very excentric elliptic oscillation.

$$V' = \frac{V\lambda}{\pi n} =$$

velocity of planetary revolution at Sun's equatorial surface under the volume due to internal work.

$$V'' = \frac{V\lambda}{\pi n^2} =$$

equatorial velocity of solar rotation under the volume due to internal work = mean velocity of a radial oscillation between the two members of our binary star (the Sun and Jupiter) synchronous with the revolution of the binary star about its center of gravity (4332.585 days).

$4\,V''$ = mean velocity of a perpetual radial, or extremely excentric oscillation, synchronous with the revolution of the binary star = mean velocity of the binary star in space.

$T'\ T''$ = time of revolution, rotation for $V'\ V''$.

$t'\ t''$ = time of revolution, rotation for Earth.

$\tau'\ \tau''$ = time of revolution, rotation for Jupiter.

$$\frac{2\,V\lambda}{T''},\quad \frac{2\,V'}{t''},\quad \frac{2\,V'}{\tau''} =$$

equatorial g at Sun, Earth and Jupiter.

$\frac{1}{32}\pi^{2\nu}$ = ratio of the integral of infinitesimal impulses during revolution in a circular orbit π^{ν}, to the integral of similar impulses during fall from circumference to center of same orbit.

$\frac{1}{32}\pi^{6}$ = Neptune's mean distance from Sun, in units of Earth's mean distance.

$\frac{1}{32}\pi^{5}$ = Saturn's mean distance.

$\frac{1}{32}\pi^{4}$ = Asteroidal mean distance , or twice mean distance of Mars.

$\frac{1}{32}\pi^{3}$ = Earth's secular mean perihelion distance.

$\frac{1}{32}\pi^{2}$ = Mercury's secular mean perihelion distance.

$\frac{1}{32}\pi^{-1}$ = major axis of Sun's orbit about center of gravity of binary star.

$\frac{1}{32}\pi^{-2}$ = heliocentric distance of linear center of oscillation of secular mean perihelion center of gravity of the binary star.

The ratio of V' to V'' is found by supposing Sun's radius to vary from r to $n^2\,r$. Under such variations

$$V' \propto \frac{1}{n};\quad V'' \propto \frac{1}{n^2}.$$

In the following table A represents the theoretical values as estimated from $V\lambda$; B, for Jupiter's distance, $\varDelta$,

$$V'' = \frac{2\,\pi\,\tau'}{\varDelta};$$

C the observed values. For T'', C is the mean of the several estimates published by Bianchi and Laugier, Lelambre, Petersen, Sporer, Carrington and Faye. The Sun's annual motion is given in units of Earth's radius vector, C being Struve's estimate. For V', A, B and C are deduced from g on Sun, Earth and Jupiter:

	A	B	C
T''	22,036.45 sec.	21,639.07 sec.	21,628.02 sec.
V'	265.66 m.	261.39 m.	261.56 m.
$4\ V'' \times 1$ yr.	1.678 r. v.	1.754 r. v.	1.623 r. v.

The $\frac{1}{32}\pi^{2\nu}$ series groups the principal planets into four pairs. The correspondence between the theoretical and observed values is given below in units of Sun's radius. The values of the secular mean apsides are taken from "Stockwell's Memoirs on the Secular Variations of the Orbits of the Eight Principal Planets."

	Theoretical.	*Observed.*
Neptune, mean,	6,450.776	6,453.751
Saturn, mean,	2,053.346	2,049.514
Asteroid, mean,	653.600	654.760
Earth, perihelion,	208.048	207.583
Mercury, perihelion,	66.224	68.483
Sun, major axis,	2.136	2.132
Primary center, osc.,	.679	.679

The slight discrepancies in the values of T'', V', V'', seem to be attributable to Jupiter's mean eccentricity, but they are all within the limits of uncertainty of observation.

PERFECT CUBES.

BY PROF. W. D. HENKLE, SALEM, OHIO.

The following interesting facts in reference to perfect cubes were discovered by the writer about seven years ago:

Perfect cubes ending in 1, 2, 3, 4, 5, 6, 7, 8, 9 or 0 followed by 1
have roots ending in 7, 4, 1, 8, 5, 2, 9, 6, 3 or 0 followed by 1.

Perfect cubes ending in 1, 2, 3, 4, 5, 6, 7, 8, 9 or 0 followed by 3
have roots ending in 1, 4, 7, 0, 3, 6, 9, 2, 5 or 8 followed by 7.

Perfect cubes ending in 1, 2, 3, 4, 5, 6, 7, 8, 9 or 0 followed by 7
have roots ending in 7, 0, 3, 6, 9, 2, 5, 8, 1 or 4 followed by 3.

Perfect cubes ending in 1, 2, 3, 4, 5, 6, 7, 8, 9 or 0 followed by 9
have roots ending in 3, 0, 7, 4, 1, 8, 5, 2, 9 or 6 followed by 9.

Hence every perfect cube ending in 11 has 71 as the ending of its root; every perfect cube ending in 21 has 41 as the ending of its root; and so on. Thus we see that the last two figures of any perfect cube ending in 1, 3, 7 or 9 may be known if the figure before 1, 3, 7 or 9 is also known. For instance the cube root of the perfect cube 185193 may be known to be 57 because all perfect cubes ending in 93 have roots ending in 57. Thus we may know the cube root of the perfect cube 3,869,893 by knowing only 3, ... 93. The first figure of the root must be 1 and the next two 57.

If the series 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 be repeated or made circular it